

IES-2000

Integrated Ethernet Switch

Version 2.00

February 2003

User's Guide

ZyXEL

TOTAL INTERNET ACCESS SOLUTION

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- (2) This device must accept any interference received, including interference that may cause undesired operations.

FCC Warning!

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

CE Mark Warning:

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ZyXEL warrants to the original end user (purchaser) that this product is free from any defects in materials or workmanship for a period of up to two years from the date of purchase. During the warranty period, and upon proof of purchase, should the product have indications of failure due to faulty workmanship and/or materials, ZyXEL will, at its discretion, repair or replace the defective products or components without charge for either parts or labor, and to whatever extent it shall deem necessary to restore the product or components to proper operating condition. Any replacement will consist of a new or re-manufactured functionally equivalent product of equal value, and will be solely at the discretion of ZyXEL. This warranty shall not apply if the product is modified, misused, tampered with, damaged by an act of God, or subjected to abnormal working conditions.

Note

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Please have the following information ready when you contact customer support.

- Product model and serial number.
- Warranty information.
- Date that you received your device.
- Brief description of the problem and the steps you took to solve it.

METHOD	E-MAIL SUPPORT/SALES	TELEPHONE/FAX	WEB SITE/ FTP SITE	REGULAR MAIL
LOCATION				
WORLDWIDE	support@zyxel.com.tw sales@zyxel.com.tw	+886-3-578-3942 +886-3-578-2439	www.zyxel.com www.europe.zyxel.com ftp.europe.zyxel.com	ZyXEL Communications Corp., 6 Innovation Road II, Science- Based Industrial Park, Hsinchu 300, Taiwan.
NORTH AMERICA	support@zyxel.com sales@zyxel.com	+1-714-632-0882 800-255-4101 +1-714-632-0858	www.zyxel.com ftp.zyxel.com	ZyXEL Communications Inc., 1650 Miraloma Avenue, Placentia, CA 92870, U.S.A.
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Preface

Congratulations on your purchase of the IES-2000 Integrated Ethernet Switch.

About this User's Manual

This user's guide gives hardware installation, connection and maintenance instructions. It also gives specifications.

Online Registration

Register your ZyXEL product online at www.zyxel.com for free future product updates and information.

General Syntax Conventions

For brevity's sake, we will use "e.g.," as shorthand for "for instance", and "i.e.," for "that is" or "in other words".

Naming Conventions

- The IES-2000 may be referred to as the IES.
- IES-2000 refers to the IES-2000 main chassis and its cards along with the IES-2000 splitter chassis and its cards.
- The IES-2000M is the IES-2000 main chassis.
- The IES-2000ST is the IES-2000 splitter chassis with Telco-50 connectors.
- The IES-2000SW is the IES-2000 splitter chassis with wire wrapping pins.
- The MSC1000, MSC1000A or MSC1000AL (Management Switch Card) may be referred to as the switch card or MSC.
- The EEC1020 (Ethernet Extension Card) may be referred to as the EEC.

Related Documentation

- DSL Line Card User's Guides

These user's guides provide hardware connection details and explain how to configure and manage the individual line cards.

- Management Switch Card User's Guide

This user's guide provides hardware connection details and configuration and management instructions for the management switch card.

- EEC1020 User's Guide

These user's guides provide hardware connection details for the Ethernet Extension Card.

- Glossary and ZyXEL Web Site

Please refer to www.zyxel.com for an online glossary of networking terms or the ZyXEL download library for additional support documentation.

Part I:

Hardware Overview

This part introduces the Integrated Ethernet Switch and gives some application examples.

Chapter 1

Hardware Overview

This chapter describes the key features, specifications and applications of your IES-2000.

The IES-2000 (Integrated Ethernet Switch) is an IP-based DSLAM (Internet Protocol Digital Subscriber Line Access Multiplexer) that connects DSL subscribers to the Internet. As a high-performance but yet compact and versatile platform, it can conveniently deliver broadband Internet access to telephone company central offices, multi-tenant units (MTUs), hospitals, hotels, schools, university campuses and ISPs. The IES-2000's low cost and easy management make it a perfect DSL-provider solution.

The IES-2000 platform allows for convenient management and support of various DSL technologies. With the ability to hold a maximum of five line cards, up to 120 DSL subscribers can simultaneously utilize a wide range of powerful broadband services. Additionally, the DSL line cards are hot swappable; thus, you do not need to interrupt the service of other cards to change or service an individual card. A single management switch card can provide the convenience of centralized network traffic supervision.

1.1 Front Panel

The following figure shows the front panels of the IES-2000 main chassis and splitter chassis with installed line and splitter cards.

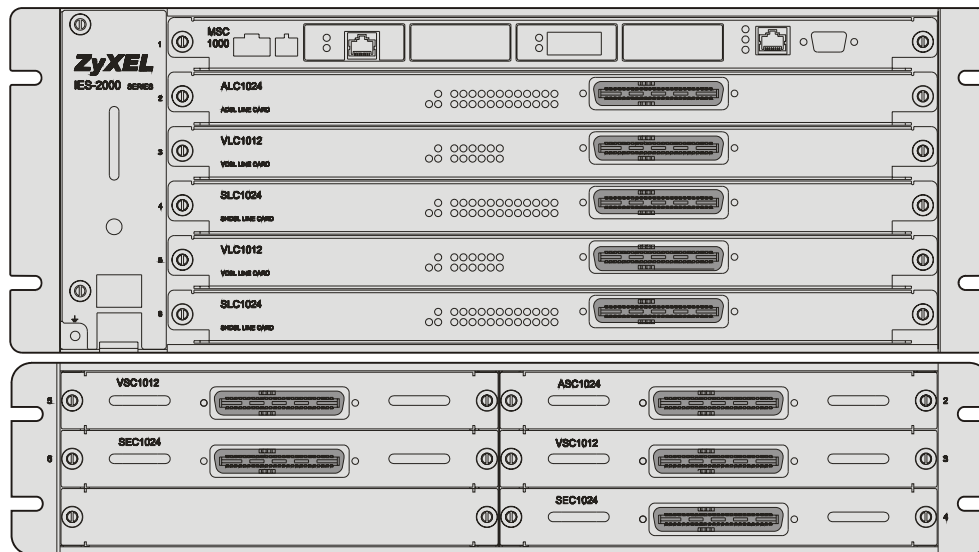


Figure 1-1 IES-2000 Front Panel

1.2 Features

Main Chassis

The main chassis has slots for hot-swappable DSL line cards and a management switch card or Ethernet extension card.

Splitter Chassis

The splitter chassis has slots for hot-swappable splitter and extension cards, and Telco-50 connectors or wire wrapping pins for connecting to the subscribers and the PBX (Private Branch Exchange) or PSTN/ISDN (Public Switched Telephone Network)(Integrated Services Digital Network) switch.

Hot Swappable DSL Line Cards

The IES-2000 uses hot swappable DSL line cards.

Hot Swappable Splitter Cards

The IES-2000 uses hot swappable splitter cards.

Management Switch Card

The IES-2000 accommodates a management switch card that switches traffic and forwards it between the DSL line cards and other Ethernet switches.

Ethernet Extension Card

The IES-2000 accommodates an Ethernet extension card that allows you to make an Ethernet connection to each DSL line card for uplink and management.

Hot Swappable Fan Module

The IES-2000 is equipped with a hot swappable fan module to provide easy maintenance, greater reliability and increased system operating lifetimes.

Power Module

You can easily access the IES-2000's power module to change a fuse.

Scalable Platform for Future Expansion

The flexible design of the IES-2000 allows service providers to start with minimum cost. As the number of users and applications increases, additional DSL line cards can be added to support more subscribers.

1.3 Applications

The following sections describe example applications for the IES-2000. This figure gives an example overview.

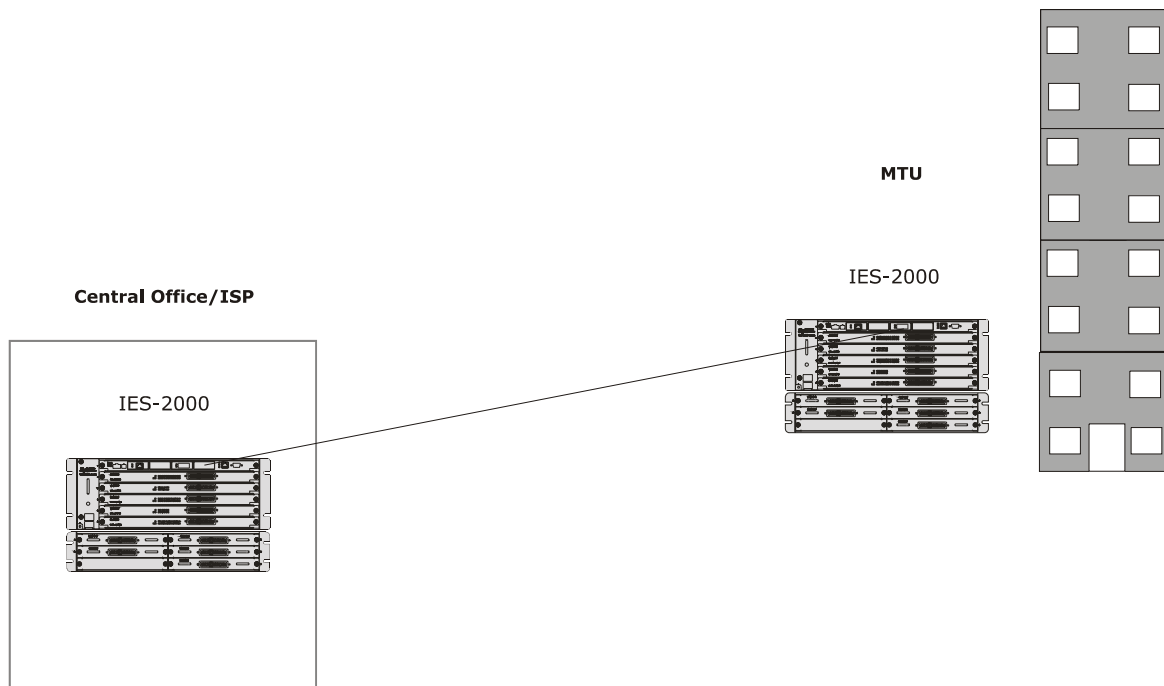


Figure 1-2 Application Overview Example

1.3.1 IP DSLAM

The IES-2000 operates as an IP DSLAM in a telephone company's central office. It provides DSL service over telephone wires to subscribers. The following figure shows the IES-2000 set up in a telephone company's central office.

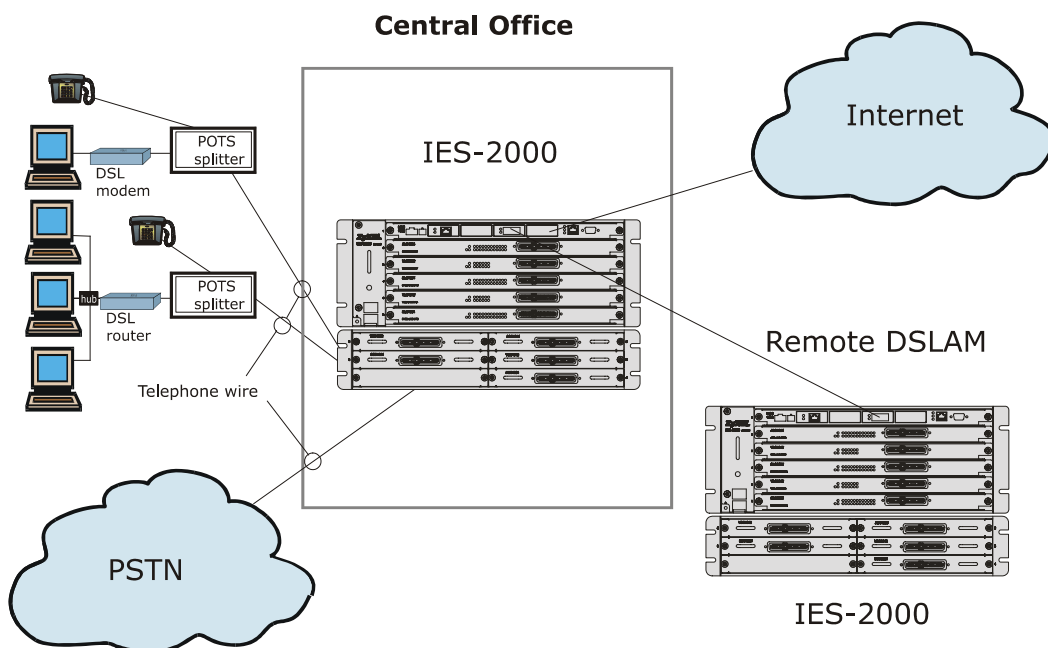


Figure 1-3 IP DSLAM Application Example

1.3.2 MTU Application

The following figure depicts a typical application of the IES-2000 in a large residential building, or multiple tenant unit (MTU), that leverages the existing phone line wiring to provide Internet access to subscribers in the building.

A subscriber connects a computer to the phone line in a unit using an ADSL modem. The other end of the phone line is connected to a port on the IES-2000. The IES-2000 aggregates the traffic from subscribers and then forwards it through an Ethernet connection to the Internet.

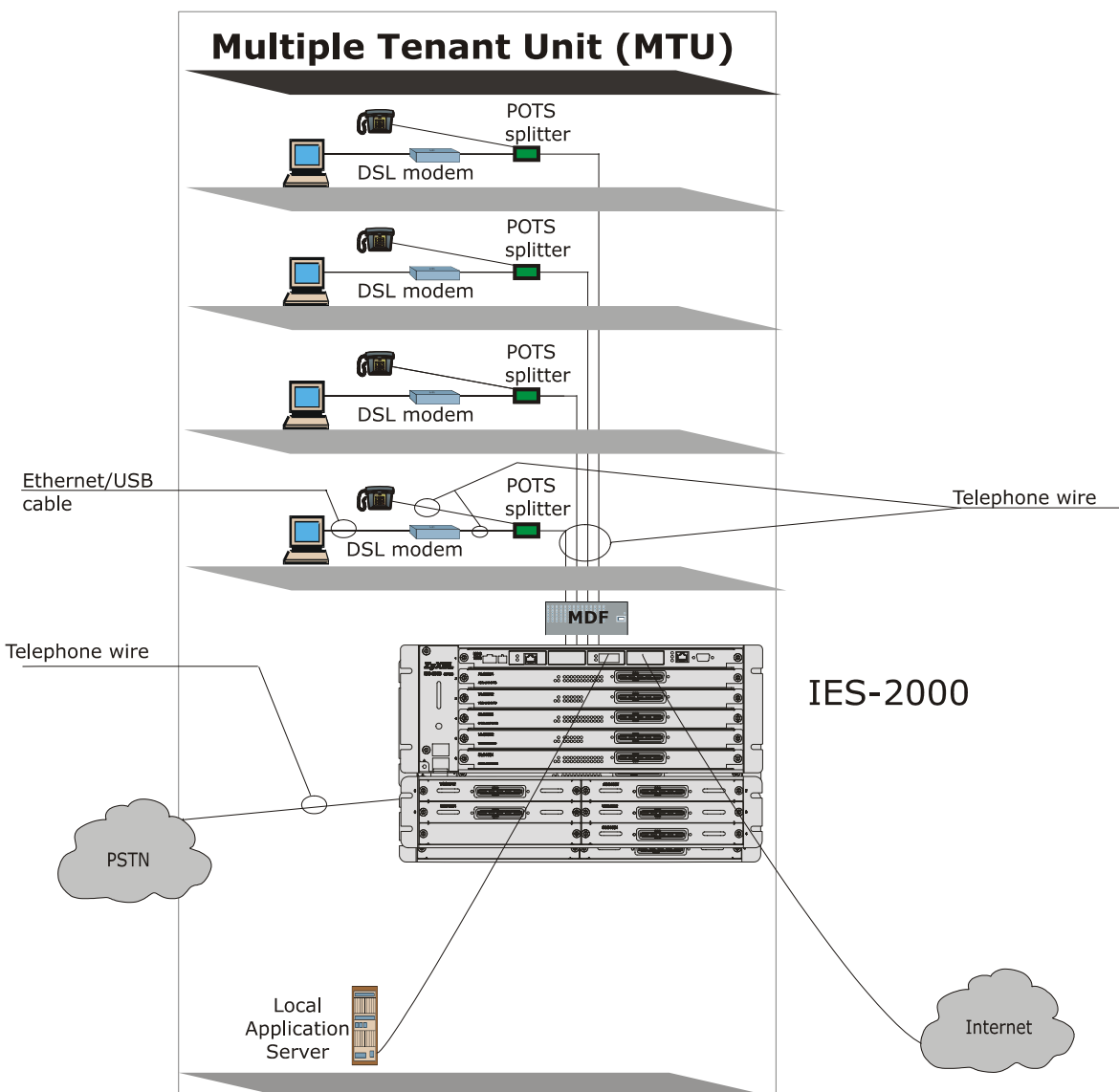


Figure 1-4 MTU Application Example

Part II:

Installation

This part describes how to install the IES-2000 chassis and cards.

Chapter 2

Chassis Installation

This chapter shows you how to install hardware for a rack-mounted scenario.

2.1 General Installation Instructions

Read all the safety warnings in the appendix before you begin and make sure you follow them.

Perform the installation as follows:

- Step 1.** Make sure the IES-2000 power switch is in the **OFF** position.
- Step 2.** Refer to this chapter for details on installing the main and splitter chassis. Make sure you connect the frame grounds before you make any other connections (refer to section 2.4).
- Step 3.** If either the main chassis cards or the splitter cards are not already installed, follow the procedure in *Chapter 3* to install them.
- Step 4.** Refer to the chapter on front panel connections for instructions on making front panel connections for the cards.
- Step 5.** Refer to the chapter on MDF connections for instructions on making rear panel connections for the splitter chassis.
- Step 6.** Refer to the chapter on power connections for instructions on making power connections and turning on the IES-2000.

2.2 Rack-mounted Installation Requirements

Make sure the rack will safely support the combined weight of all the equipment it contains.

Make sure the position of the IES-2000 does not make the rack unstable or top-heavy. Take all necessary precautions to anchor the rack securely before installing the unit.

- Use a #2 Philips screwdriver to install the screws.
- Refer to the *Hardware Specifications* appendix for the gauge of wire to use for the frame ground connections.
- Refer to the *Hardware Specifications* appendix for the hardware that is required to mount the IES-2000.

Failure to use the proper screws may damage the unit.

2.3 Mounting the IES-2000 Chassis on a Rack

- Make sure that nothing obstructs the airflow of the main chassis.

- If you are facing the IES-2000 main chassis front panel, the fan exhaust vents are located on the right side panel of the unit and the fans along with the intake vents are located on the left side panel.

Use the following procedure to install the chassis in the rack.

Install the main chassis and splitter chassis in a rack with the splitter chassis directly below the main chassis.

- Step 1.** Position a mounting bracket (that is already attached to the chassis) on one side of the rack, lining up the screw holes on the bracket with the screw holes on the side of the rack (see the figure shown next).
- Step 2.** Use the screwdriver to install the screws through the mounting bracket holes into the rack.
- Step 3.** Repeat Step 1 and Step 2 to attach the second mounting bracket on the other side of the rack.

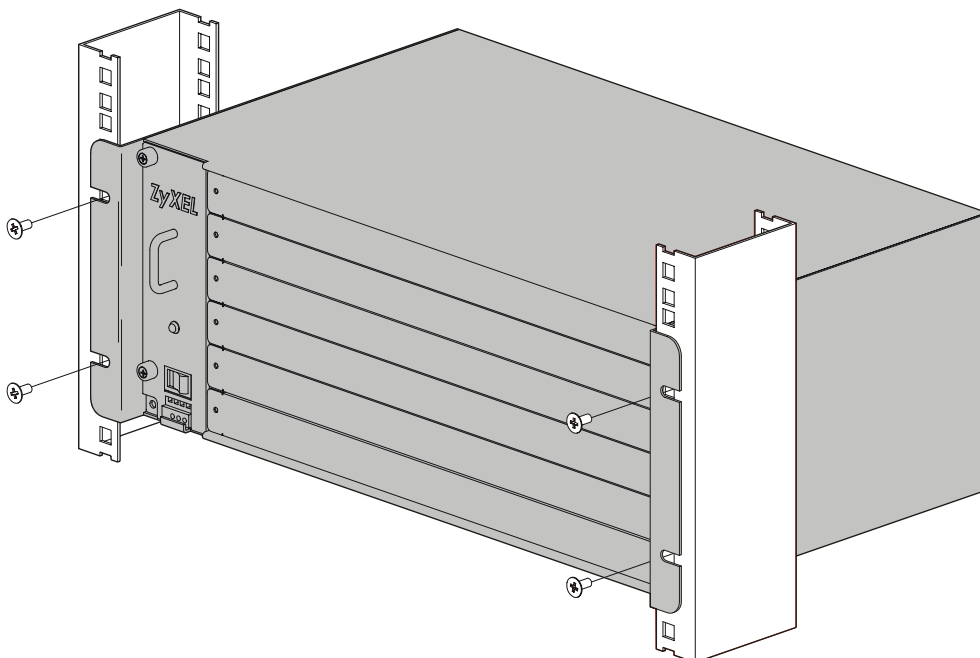


Figure 2-1 Rack Mounting the Chassis

2.4 Connecting the Frame Ground

Refer to the Hardware Specifications appendix for the ground wire gauge.

- The IES-2000 main chassis frame ground is on the lower left corner of the front panel.
- The IES-2000 splitter chassis has two frame grounds is on the rear panel of the main chassis.
- Connect the frame grounds to a building's protective earthing terminals using a green-and-yellow frame ground wire.

Warning!

Connect the frame ground before you connect any other cables or wiring.

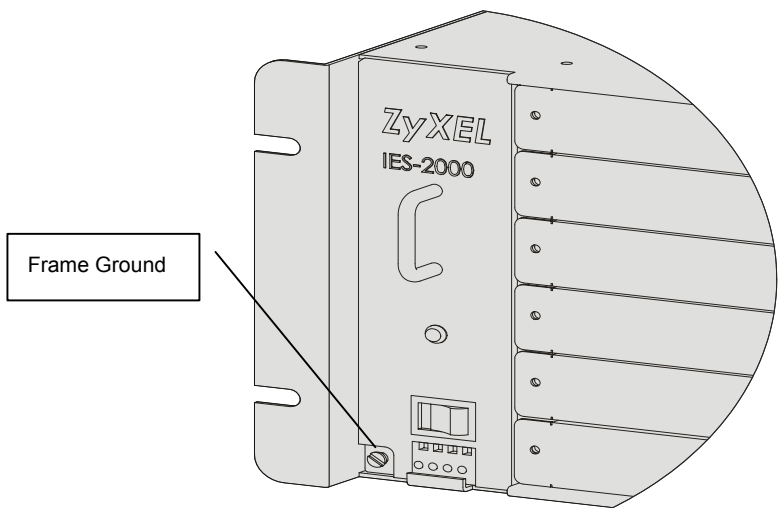


Figure 2-2 IES-2000 Main Chassis Frame Ground



Figure 2-3 IES-2000 Splitter Chassis Frame Ground

Chapter 3

Card Installation

This chapter shows you how to install and remove main chassis and splitter chassis cards.

3.1 Installing a Main Chassis Card

Use the following procedure to install a management switch card or a DSL line card in the main chassis.

Install the line cards starting from the bottommost slot.

Install a management switch card or Ethernet extension card in slot 1 on the IES-2000.

- Step 1.** Grasp the center of the front panel of the card with one hand and place the other hand under the card to support it.
- Step 2.** Insert the card halfway into the slot and spread the two ejector levers outward. Make sure the ejector levers are perpendicular to the front panel.
- Step 3.** Slide the card into the slot until it makes contact with the backplane. The ejector levers should be at a small angle to the front panel now.
- Step 4.** Push the two ejector levers firmly until they are flush with the front panel.
- Step 5.** Tighten the two thumbscrews.

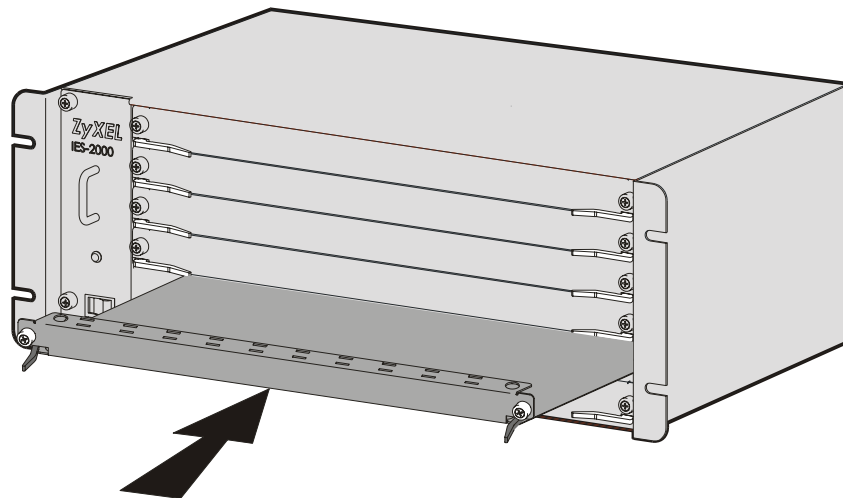


Figure 3-1 Installing a Main Chassis Card

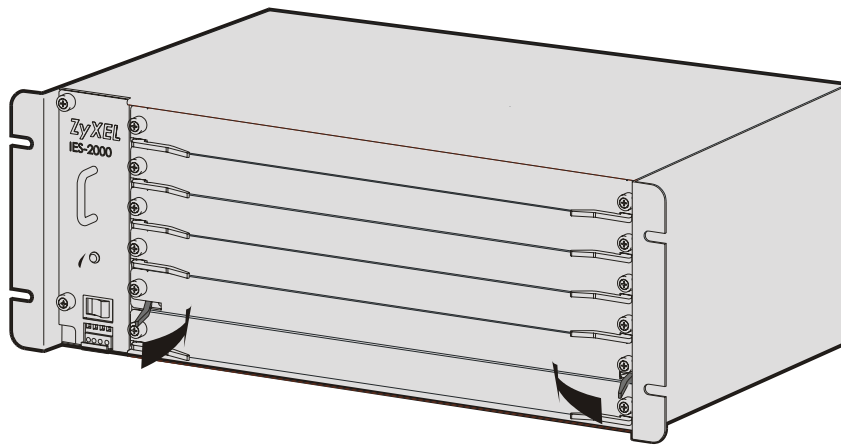


Figure 3-2 Closing the Ejector Levers

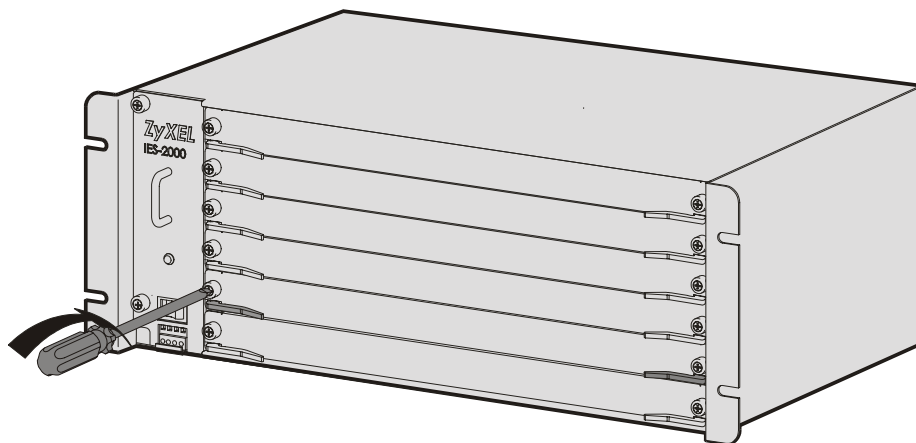


Figure 3-3 Tightening Main Chassis Card Thumbscrews

3.2 Removing a Main Chassis Card

- Step 1.** Disconnect all cables from the card.
- Step 2.** Loosen the two thumbscrews.
- Step 3.** Pull the two ejector levers firmly until the front of the card is clear of the chassis. Pull the ejector levers until they are perpendicular to the front panel.
- Step 4.** Grasp the center of the front panel of the card with one hand and place the other hand under the card to support it.
- Step 5.** Slide the card out of the slot.

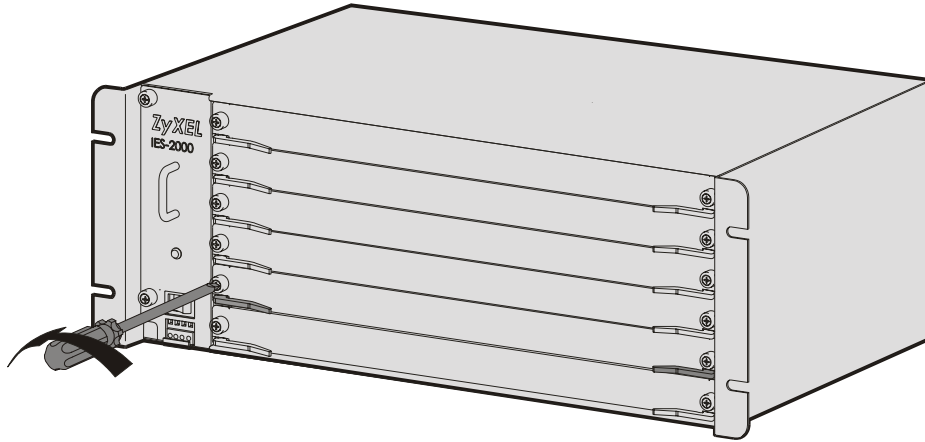


Figure 3-4 Loosening Main Chassis Card Thumbscrews

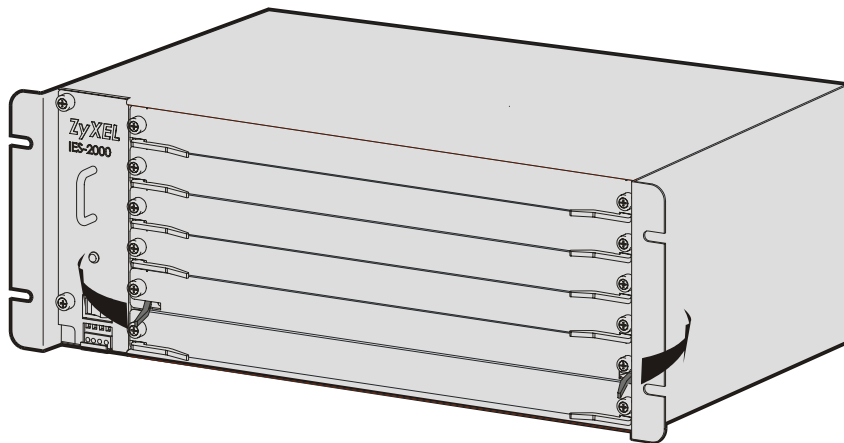


Figure 3-5 Opening the Ejector Levers

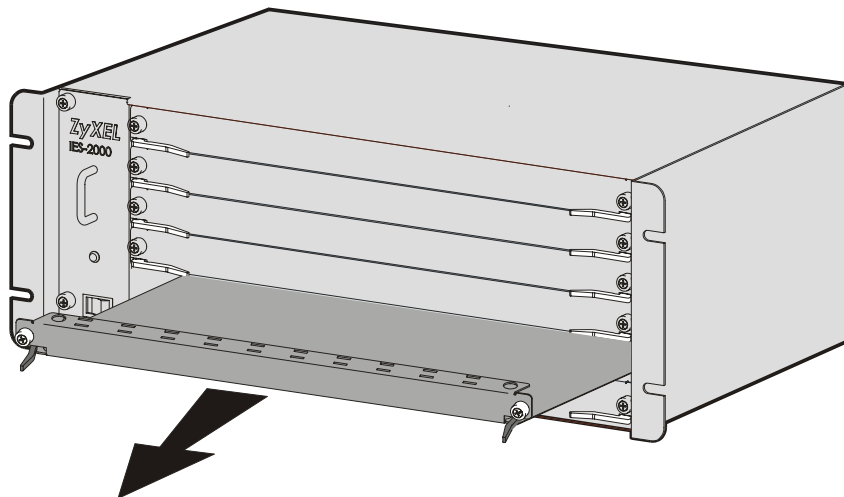


Figure 3-6 Removing a Main Chassis Card

3.3 Installing a Splitter Chassis Card

The splitter card's type and slot number must match those of the DSL line card to which it is to connect. For example, connect a VSC1012 in slot 2 of the splitter chassis if there is a VLC1012 in slot 2 of the main chassis. Do not use the unnumbered splitter slot; leave its slot cover on.

Use the following procedure to install a splitter card in the splitter chassis.

- Step 1.** Install the splitter card in the same slot number on the splitter chassis as the corresponding line card in the main chassis (the management switch card or Ethernet extension card does not need a splitter chassis card).
- Step 2.** Grasp the center of the front panel of the card with one hand and place the other hand under the card to support it.
- Step 3.** Insert the card into the slot and push it in until the front panel of the card is flush with the front panel of the splitter chassis.
- Step 4.** Tighten the two thumbscrews.

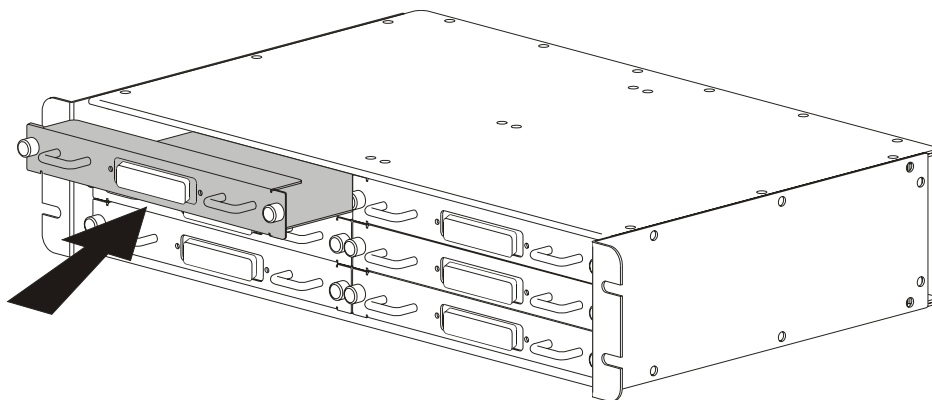


Figure 3-7 Installing a Splitter Chassis Card

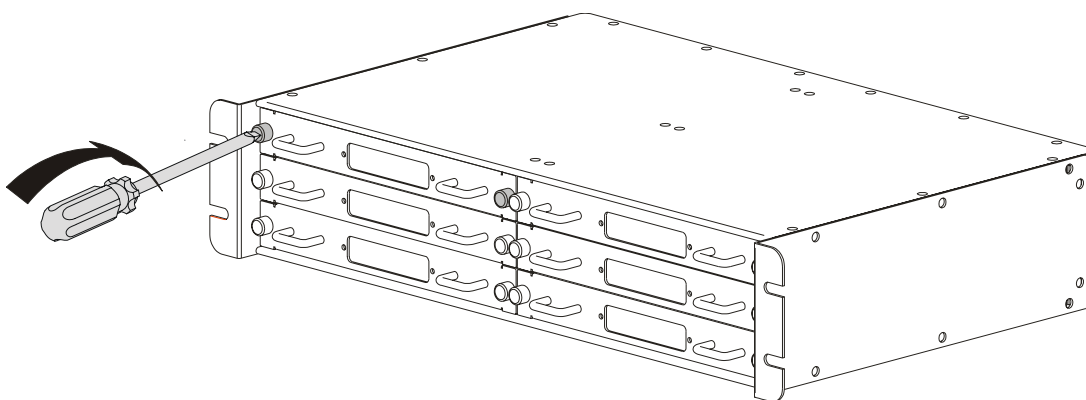


Figure 3-8 Tightening Splitter Chassis Card Thumbscrews

3.4 Removing a Splitter Chassis Card

Use the following procedure to remove a splitter card from the IES-2000 splitter chassis.

- Step 1.** Disconnect the cable from the card.
- Step 2.** Loosen the two thumbscrews.
- Step 3.** Grasp the handles on the front panel of the card and start to pull the card out.
- Step 4.** After you have the card partially out of the chassis, place one hand under the card to support it.
- Step 5.** Slide the card out of the slot.

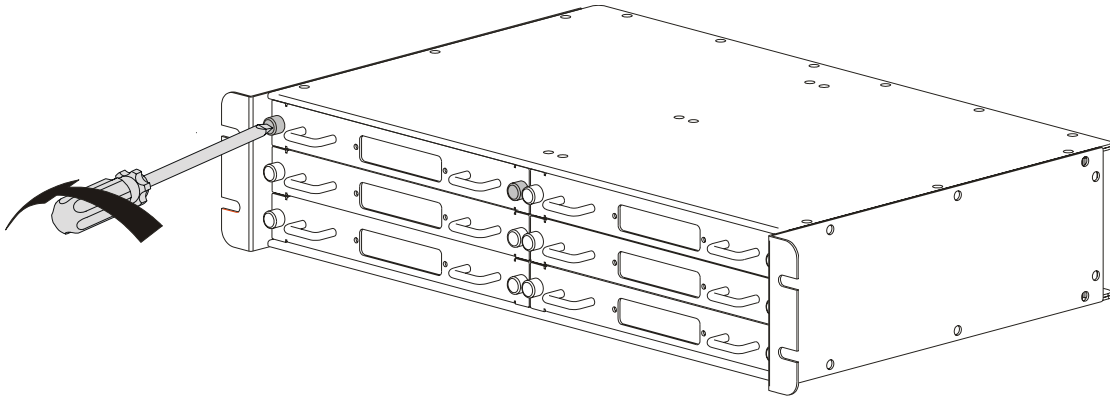


Figure 3-9 Loosening Splitter Chassis Card Thumbscrews

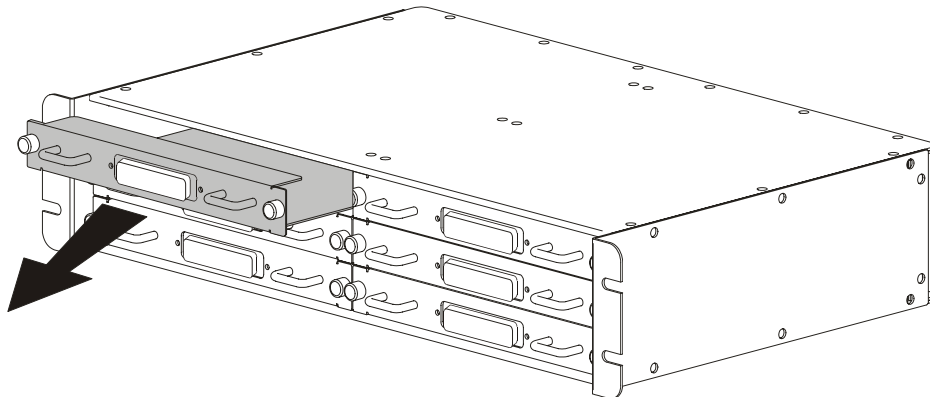


Figure 3-10 Removing a Splitter Chassis Card

Part III:

Connections

This part describes how to connect the IES-2000 to a Main Distribution Frame (MDF) and connect the power.

Chapter 4

Front Panel Connections

This chapter explains how to connect the cards.

4.1 Making Card Connections

The following describes how to connect the DSL line cards to the splitter chassis cards. For the Ethernet extension card or the management switch card, refer to the card's *User's Guide* for instructions on making the connections.

4.1.1 DSL Line Card Connections

Use the optional Telco-50 cable to connect the DSL line card's front panel Telco-50 connector to the corresponding splitter card's front panel Telco-50 connector. See the hardware specifications in the appendices for what lengths of ZyXEL's optional Telco-50 cables to use.

Make sure that you use the appropriate length Telco-50 cables with the DSL line cards in the IES-2000; using cables of the wrong length blocks access to other cards.

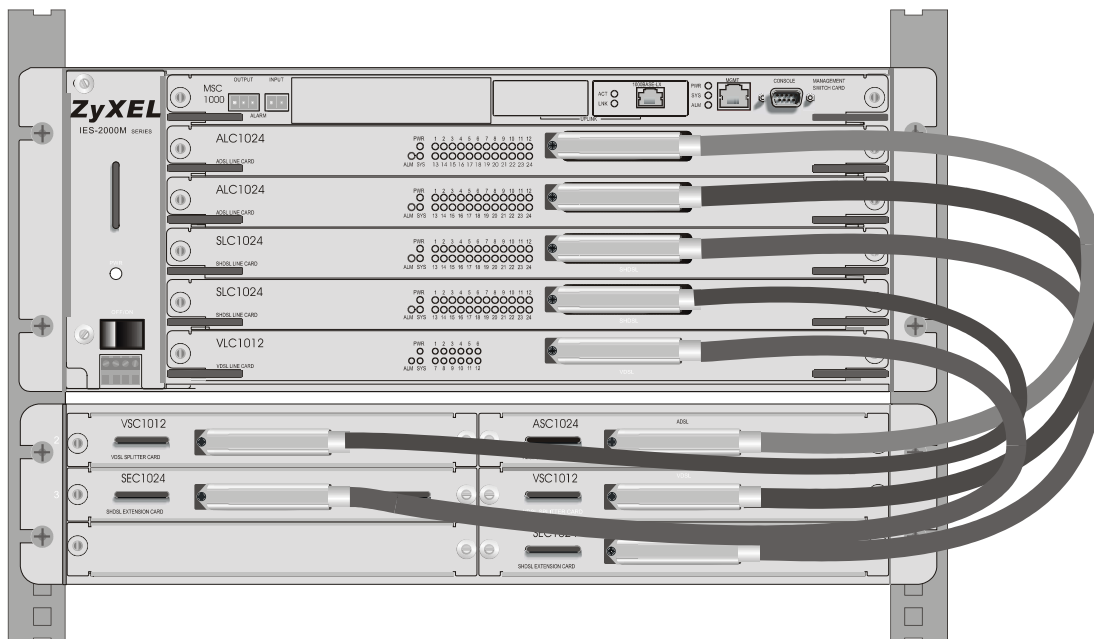


Figure 4-1 IES-2000 Front Panel Telco-50 Connections

Chapter 5

MDF Connections

This chapter shows you how to connect the splitter chassis's rear panel to an MDF.

5.1 MDF Connections Overview

Observe the following before you start:

- Images of the IES-2000ST (Splitter chassis with Telco-50 connectors) rear panel are used throughout this chapter. Connections for the splitter chassis with wire wrapping pins use the same pin assignments.
- Refer to the hardware specifications in the appendices for the gauge of telephone wire to use.
- Follow the pin assignments shown in the DSL line card's *User's Guide* to wire Telco-50 cables to Telco-50 connectors.
- Refer to the *User's Guide* of your management switch card or Ethernet extension card for details on how to make the management connections.

5.2 MDF (Main Distribution Frame)

An MDF is usually installed between subscribers' equipment and the telephone company (CO) in a basement or telephone room. The MDF is the point of termination for the outside telephone company lines coming into a building and the telephone wiring in the building.

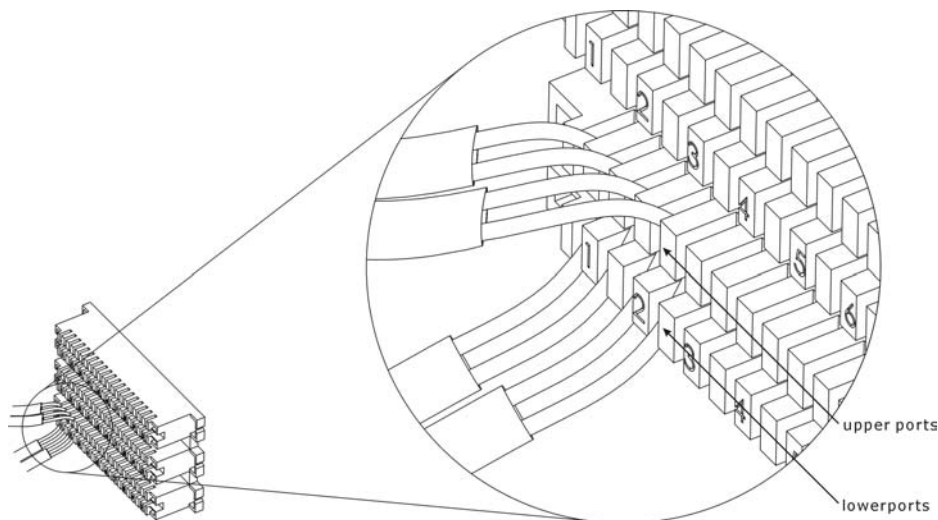


Figure 5-1 MDF (Main Distribution Frame) Wiring

- Connect wiring to end-user equipment to the lower ports of an MDF and connect wiring from the telephone company to the upper ports of an MDF (see the previous figure).

- Some MDFs have surge protection circuitry built in between the two banks; thus, do not connect telephone wires from the telephone company directly to your IES.
- Use a punch-down tool to seat telephone lines into MDF blocks.
- Multiple upper and lower MDF port connections are shown as one line in the following figures.

5.3 Telco-50 Cables

Telco-50 cables are used for data and voice applications with MDFs (Main Distribution Frame), patch panels and distribution boxes. They can also be used as extension cables. Telco-50 cables are made up of 25 twisted-pair copper wires.

Connect a Telco-50 connector to one end of the cable (see the appendices for pin assignments) and connect the other end directly to an MDF; alternatively attach RJ-11 connectors and connect directly to DSL modem(s).

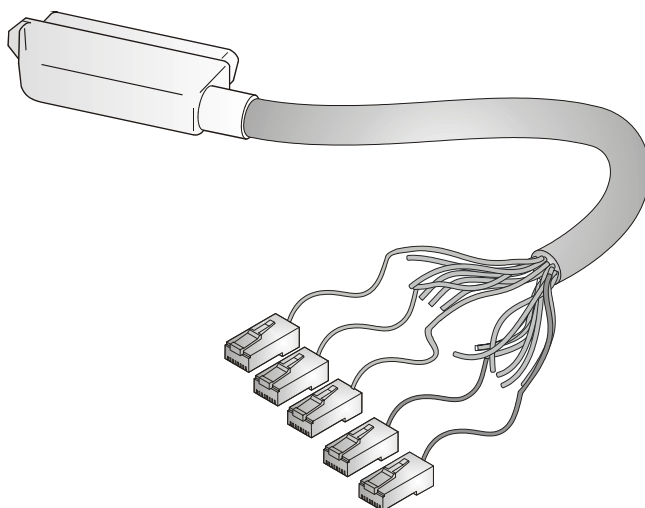


Figure 5-2 Telco-50 Cable with RJ-11 Connectors

5.4 Splitter Chassis Rear Panel Connections

A DSL splitter card separates the voice signal from the DSL signal. It feeds the DSL signal to the DSL line card and diverts the voice signal to the **CO** Telco-50 connector (or wire wrapping pins) on the splitter chassis's rear panel.

Connect the **CO** Telco-50 connector or wire wrapping pins to the PBX or PSTN/ISDN switch when using the ADSL splitter card or VDSL splitter card.

Connect the **USER** Telco-50 connector (or wire wrapping pins) to the subscribers' telephone wiring. In most multi-tenant unit applications, the **USER** pins connect to the subscribers' telephone wiring via Main Distribution Frame (MDF).

See the pin assignments in the DSL line card's *User's Guide* and the section on MDF scenarios for details on splitter chassis rear panel connections.

5.5 MDF Scenarios

The following figure gives an overview on a possible installation scenario for the IES-2000 using the ADSL or VDSL line and splitter cards. Data and voice signals can coexist on the same telephone wiring.

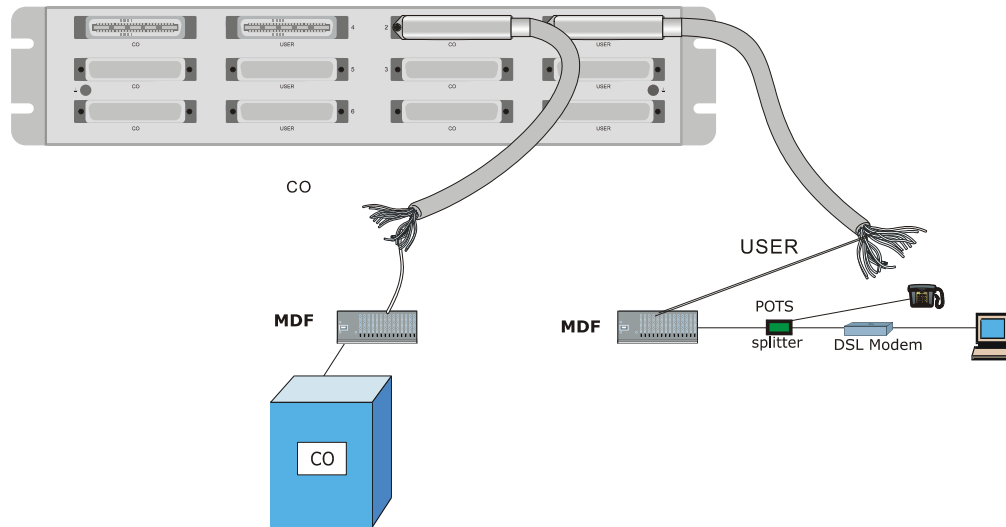


Figure 5-3 Installation Overview Example

You can also attach RJ-11 connectors to the Telco-50 cable and connect directly to a DSL modem(s) or patch panel. This chapter discusses connections using MDFs.

5.6 Typical MDF Scenarios

This section describes typical installation scenarios.

5.6.1 Installation Scenario A

You want to install the IES-2000 in an environment where there are no previously installed MDFs. There is no phone service and you want to install the IES-2000 for data-access only. No connection from the Telco-50 **CO** connector is necessary. G.SHDSL connections carry data only, thus they are best suited to this installation scenario.

You may connect using an MDF or attach RJ-11 connectors to the non-IES-2000 end of the Telco-50 cable and then connect to DSL modems directly.

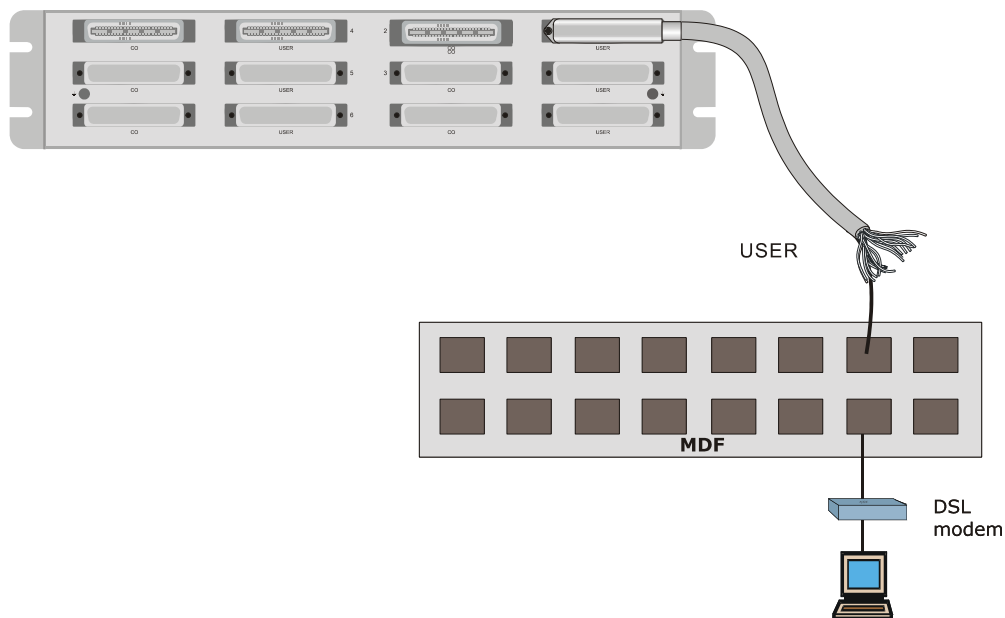


Figure 5-4 Installation Scenario A

Procedure to Connect to an MDF

- Step 1.** Connect the Telco-50 connector end of the cable to the Telco-50 connector labeled **USER** on the splitter chassis rear panel.
- Step 2.** Connect the wiring on the other end of the Telco-50 cable to the upper ports of the MDF using a punch-down tool.
- Step 3.** Connect the telephone wiring from each end-user's DSL modem to the lower ports of the MDF.

5.6.2 Installation Scenario B

Phone service is available. There is one MDF from which end-users CO connections are made (see next figure). This installation scenario does not apply to G.SHDSL connections.

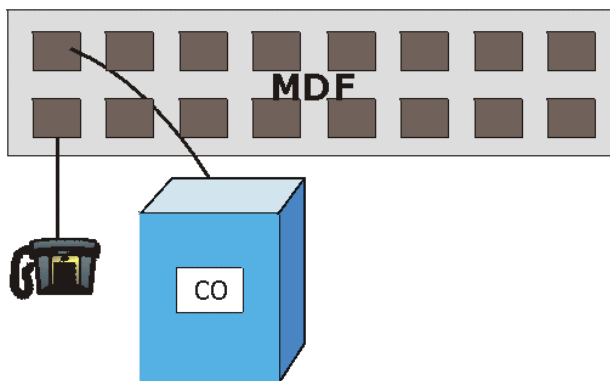


Figure 5-5 One MDF for End-user and CO Connections

This installation scenario requires three MDFs. Please refer to the following figure for the connection schema.

- MDF 1 is the original MDF used for telephone connections only.
- MDF 2 is used for telephone connections only.
- MDF 3 is for DSL service connections.

Change the wiring from MDF 1 to MDF 3 for telephone subscribers who want DSL service.

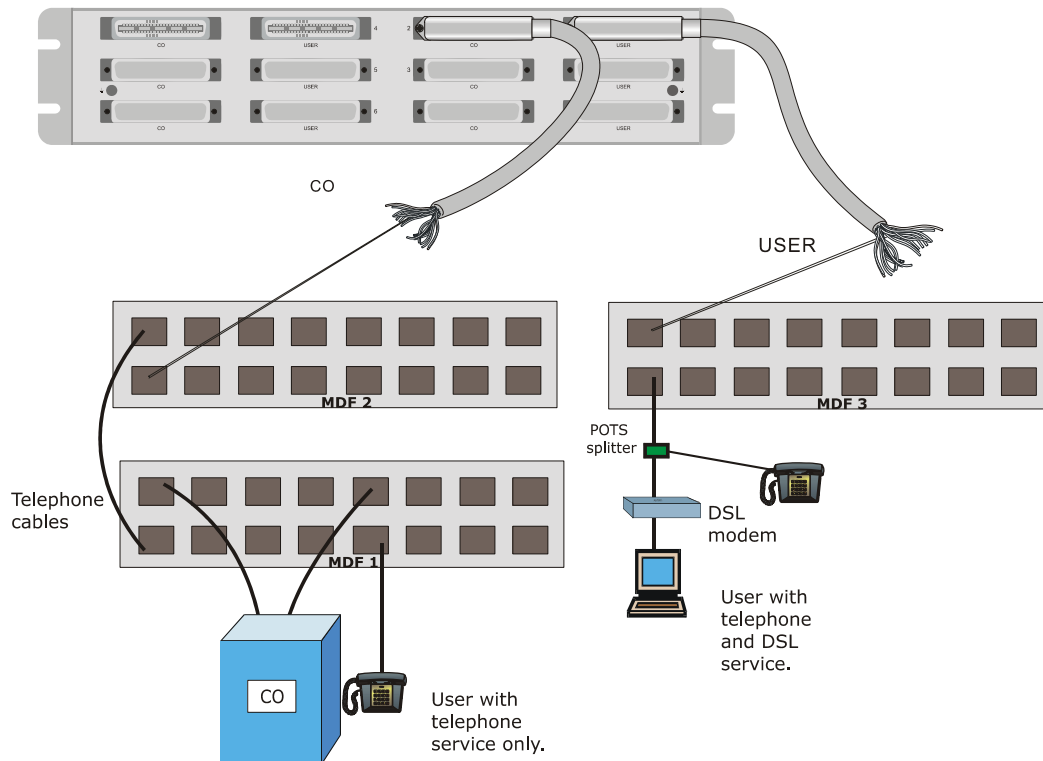


Figure 5-6 Installation Scenario B

Procedure to Connect to MDFs

- Step 1.** Connect the Telco-50 connector end of the cable you want for DSL service to the Telco-50 connector labeled **USER** on the splitter chassis rear panel.
- Step 2.** Connect the wiring on the other side of the Telco-50 cable to the upper ports of MDF 3 using a punch-down tool.
- Step 3.** Connect the telephone wiring from the end-user's DSL modem(s) to the lower ports of MDF 3.
- Step 4.** Connect the Telco-50 connector end of the cable you want for phone service to the Telco-50 connector labeled **CO** on the splitter chassis rear panel.
- Step 5.** Connect the wiring on the other side of the Telco-50 cable to the lower ports of MDF 2 using a punch-down tool.
- Step 6.** Connect the upper ports of MDF 2 to the lower ports of MDF 1 using telephone wires.
- Step 7.** Connect the upper ports of MDF 1 to the telephone company.

- Step 8.** Telephone subscribers only (non-DSL subscribers) retain connections to the lower ports of MDF 1.
- Step 9.** Change the wiring from MDF 1 to MDF 3 for telephone subscribers who want DSL service.

5.6.3 Installation Scenario C

Phone service is also available but there are two MDFs; one for end-user telephone line connections and the other one for CO telephone wiring connections (see the following figure). This installation scenario does not apply to G.SHDSL connections.

Users A and B have telephone (only) service.

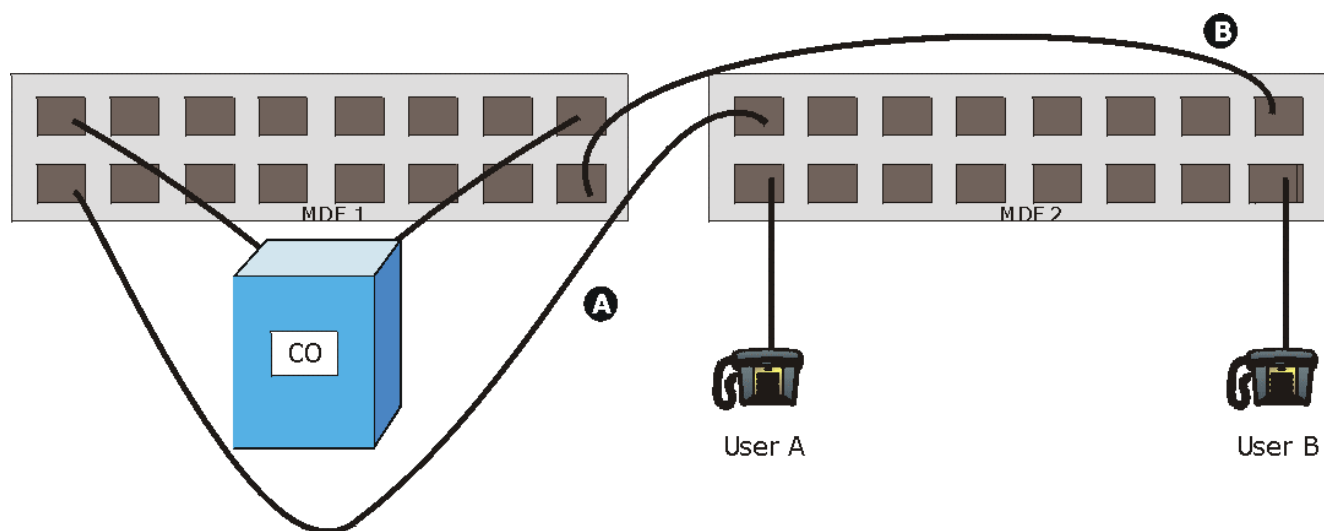


Figure 5-7 Two Separate MDFs for End-user and CO Connections

This installation scenario requires four MDFs. Please refer to the following figure for the DSL connection schema.

- MDFs 1 and 2 are the two original MDFs.
- MDFs 3 and 4 are two additional MDFs you need.

User A still has telephone service only. User B now has telephone and DSL service (see the following figure)

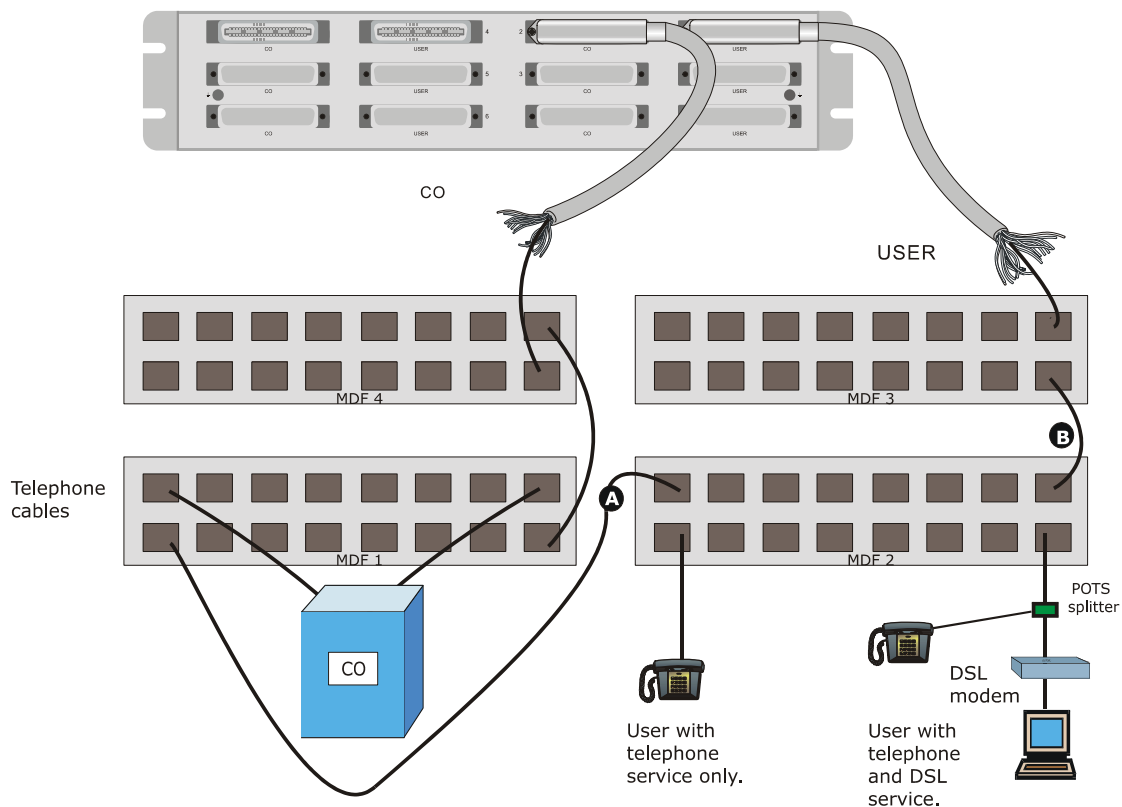


Figure 5-8 Installation Scenario C

Procedure to Connect to MDFs

- Step 1.** Connect the Telco-50 connector end of the cable you want for DSL service to the Telco-50 connector labeled **USER** on the splitter chassis rear panel.
- Step 2.** Connect the wiring on the other side of the Telco-50 cable to the upper ports of MDF 3 using a punch-down tool.
- Step 3.** Connect the lower ports of MDF 3 to the upper ports of MDF 2 for those users that want DSL service. (Users who want telephone service only, retain the original connection from the top port of MDF 2 to the bottom port of MDF 1.)
- Step 4.** Connect the telephone wiring from the end-user's DSL equipment to the lower ports of MDF 2.
- Step 5.** Connect the Telco-50 connector end of the cable you want for phone service to the Telco-50 connector labeled **CO** on the splitter chassis rear panel.
- Step 6.** Connect the wiring on the other side of the Telco-50 cable to the lower ports of MDF 4 using a punch-down tool.
- Step 7.** Connect the top ports of MDF 4 to the bottom ports of MDF 1 using telephone wires.
- Step 8.** Connect the top ports of MDF 1 to the telephone company.

Chapter 6

Power Connections

This chapter shows you how to connect the IES-2000 main chassis to a power source.

6.1 Power Connections Overview

Use the following procedures to connect the IES-2000 to a power source after you have installed the main and splitter chassis in a rack.

Refer to power supply requirements in the hardware specifications in the appendices and make sure you are using an appropriate power source.

Observe the following before you start:

- Refer to the *Hardware Specifications* appendix for the gauge of wire to use for the IES-2000 power connections.
- Keep the IES-2000 power switch in the **OFF** position until you come to procedure for turning on the power.
- Keep the power supply switch in the **OFF** position until you come to procedure for turning on the power.

Use only power wires of the required diameter for connecting the IES-2000 to a power supply (refer to the hardware specifications in the appendices for the required wire diameter).

6.2 Power Connections

Use an AC power module or an appropriate UPS (uninterruptible power supply). Refer to the hardware specifications for the IES-2000 power requirements.

The IES-2000 power connections are at the lower-left corner of the front panel of the main chassis.

6.2.1 Procedure to Connect the Power

When installing the IES-2000 power wire, push the wire firmly into the terminal as deep as possible and make sure that no exposed (bare) wire can be seen or touched.

- Step 1.** Connect one end of a power wire to the **–48V** power terminal on the front panel of your IES-2000 and tighten the terminal screw.
- Step 2.** Connect the other end of the power wire to the **–48V** terminal on the power supply.
- Step 3.** Repeat the previous step for the terminal labeled **RTN**.

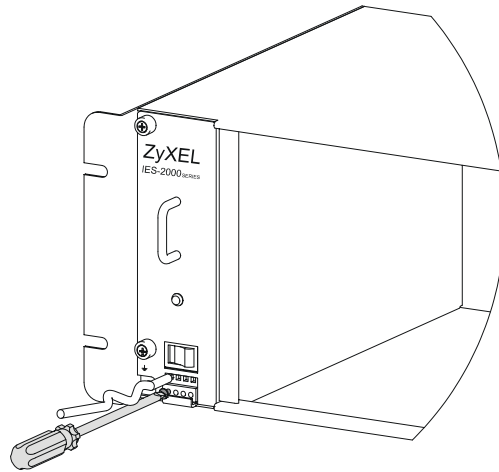


Figure 6-1 Connecting IES-2000 Power

6.3 Procedure to Turn on the IES-2000 Power

- Step 1.** Turn on the power supply.
- Step 2.** Move the IES-2000 power switch to the **ON** position.

Part IV:

Maintenance

This part describes how to change IES-2000 fuses and fan modules. It also gives troubleshooting instructions.

Chapter 7

Fan Maintenance

This chapter describes how to change a fan fuse or a fan module on the IES.

7.1 Fan Maintenance Introduction

The IES-2000 has hot-swappable fan modules. Use the following procedures to remove the fan module in order to replace a fuse. Replace the entire fan module if the fuses are not the problem. Return any malfunctioning fan modules to the manufacturer.

7.2 Removing and Installing the Fan Module

The IES-2000 fan module is at the left on the front panel of the main chassis. Perform the following procedure to remove the fan module in order to change a fan fuse or the fan module.

- Step 1.** Loosen the thumbscrews on the front of the fan module.
- Step 2.** Slide out the fan module.
- Step 3.** Replace any fuses that are burnt out (see the hardware specifications in the appendix for fuse information). If the fuses are not the problem, use a different fan module from the manufacturer.
- Step 4.** Slide the fan module back into the fan module slot.
- Step 5.** Tighten the thumbscrews.

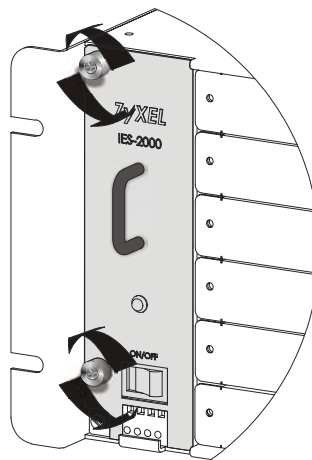


Figure 7-1 IES-2000 Fan Module Thumbscrews

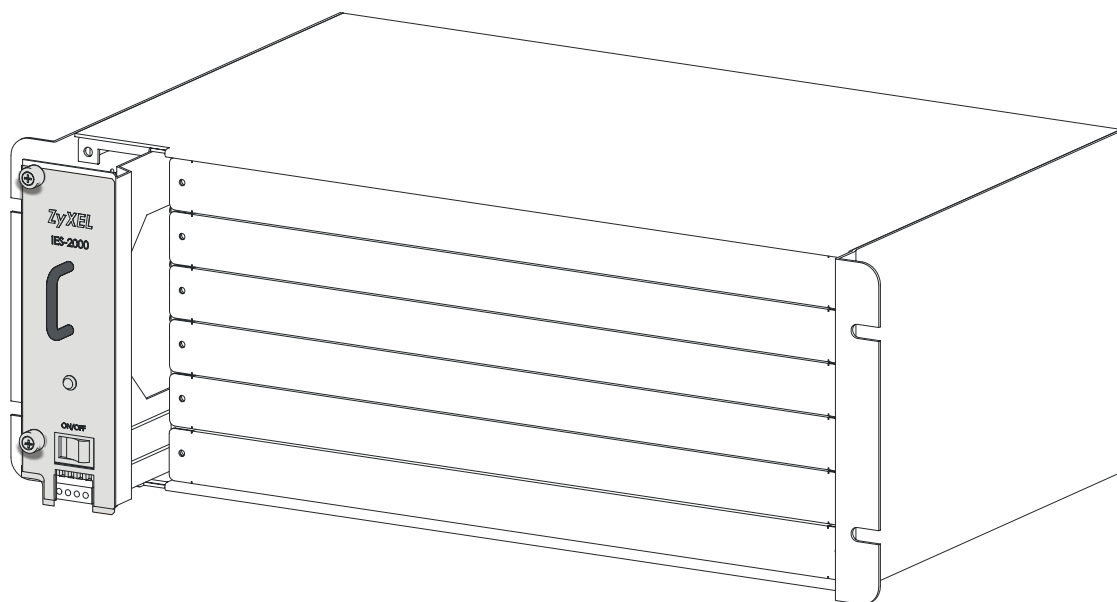


Figure 7-2 Removing the IES-2000 Fan Module

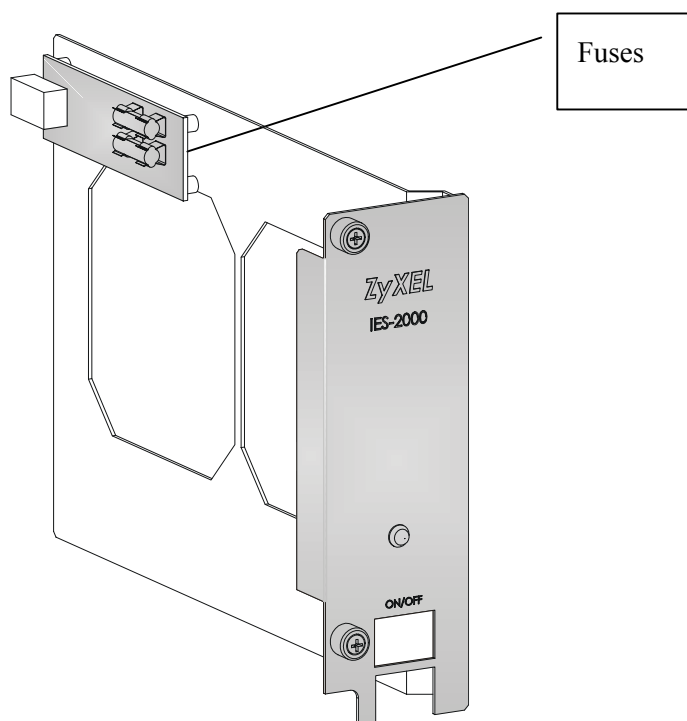


Figure 7-3 IES-2000 Fan Fuses

Chapter 8

Power Maintenance

This chapter describes how to change the IES-2000 power fuses.

8.1 Procedure to Disconnect the Power

- Step 1.** Make sure the IES-2000 power switch is in the OFF position.
- Step 2.** Turn off the power supply.
- Step 3.** Disconnect the power wires from the power supply's power terminals.
- Step 4.** Disconnect the power wires from the IES-2000 power terminals.

8.2 Procedure to Change an IES-2000 Power Fuse

The IES-2000 power is at the lower-left corner of the front panel of the main chassis. The IES-2000 power fuses are below the fan module. Use the following procedure to change an IES-2000 power fuse.

- Step 1.** Refer to *section 8.1* to disconnect the power before you begin.
- Step 2.** Refer to *section 7.2* to remove the fan module.
- Step 3.** Replace any fuses that are burnt out (see the hardware specifications in the appendix for fuse information).
- Step 4.** Slide the fan module back into the fan module slot.
- Step 5.** Tighten the fan module thumbscrews.

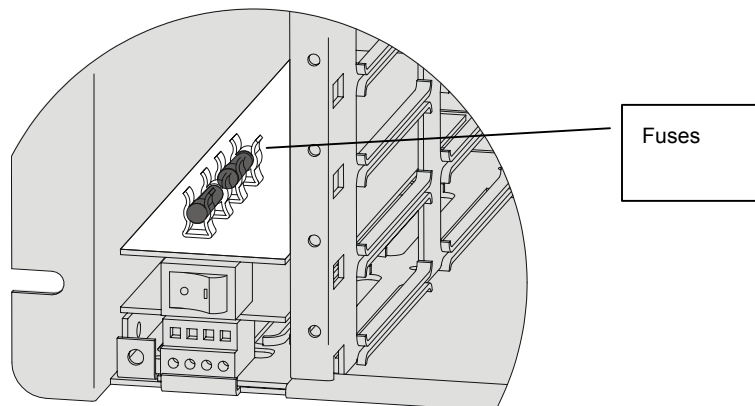


Figure 8-1 IES-2000 Power Fuses

8.3 Procedure to Reconnect the Power

- Step 1.** Reconnect the power wires to the IES-2000's power terminals.
- Step 2.** Reconnect the power wires to the power supply's power terminals.
- Step 3.** Turn the power supply back on.
- Step 4.** Turn the IES-2000 power switch back to the **ON** position.

Chapter 9

Hardware Troubleshooting

This chapter explains how to troubleshoot IES-2000 hardware. Refer also to the Troubleshooting chapters in the card User's Guides.

9.1 The SYS or PWR LED Does Not Turn On

Table 9-1 SYS LED Troubleshooting

STEP	CORRECTIVE ACTION
1	Make sure the power wires are properly connected to the power supply and the power supply is operating normally. Make sure you are using the correct power source (refer to the hardware specifications in the appendices).
2	Make sure the power wires are connected properly.
3	Make sure the main chassis card is properly installed in the main chassis.
4	Make sure the power fuses are not burnt-out. Replace any burnt out fuses. Refer to the section on power module maintenance.
5	The LED itself or the unit may be faulty; contact your vendor.

9.2 The ALM LED Is On

The management switch card's **ALM** (alarm) LED lights when the IES-2000 is overheated and/or the fans are not working properly and/or voltage readings are outside the tolerance levels.

The **ALM** (alarm) LEDs on the DSL line cards light when the card is overheated and/or voltage readings are outside the tolerance levels.

Table 9-2 ALM LED Troubleshooting

STEP	CORRECTIVE ACTION
1	Go to the Hardware Monitor screen in the web configurator to verify the cause of the alarm. See step 2 if the unit is overheated, step 3 if the problem is with the fans and step 4 if the voltages are out of the allowed ranges.
2	Ensure that the IES-2000 is installed in a well-ventilated area and that normal operation of the fans is not inhibited. Keep the bottom, top and all sides clear of obstructions and away from the exhaust of other equipment.
3	Make sure you can feel and/or hear the fans working - working fans emit a low buzz and blow air. If the fans are not working properly, refer to the sections on the fan modules for instructions on changing a fuse or changing the fan module.
4	If the voltage levels are outside the allowed range, take a screen shot of the Hardware Monitor web configurator screen and contact your vendor.

9.3 A DSL LED Does Not Turn On

The DSL LEDs show the operational status of the DSL port connections. If a DSL LED is off, it means the link to the DSL modem/router is down.

Table 9-3 DSL LED Troubleshooting

STEP	CORRECTIVE ACTION
1	Ensure that all hardware connections are properly made (including the modem/router on the subscriber's side) and that all devices are turned on.
2	Make sure the DSL port is enabled (refer to the <i>User's Guide</i>).
3	Check the DSL line pin assignments shown in the appendix.
4	Check the telephone wire connections between the G.SHDSL modem/router and the MDF(s).
5	Check the telephone wire and connections between the MDF(s) and DSL port(s).
6	Check the telephone wire mapping on the MDF(s) – see the chapter on MDF connections.
7	Make sure the in-house wiring works and is connected properly to the MDFs.
8	Make sure the line speed is consistent between the IES-2000 side and the CPE (Customer Premise Equipment) side.
9	If your line quality is low, you may need to select a slower line speed for both the IES-2000 and CPE sides. Refer to the <i>User's Guide</i> .

9.4 No Voice on an ADSL or VDSL Connection

The ADSL and VDSL line and splitter cards allow the telephone wiring used for ADSL and VDSL connections to also simultaneously carry normal voice conversations.

Table 9-4 Voice Troubleshooting

STEP	CORRECTIVE ACTION
1	Make sure the subscriber has a POTS splitter properly installed.
2	Check the telephone wire connections between the subscriber and the MDF(s).
3	Check the telephone wire and connections between the MDF(s) and USER port(s). Refer to the pin assignments shown in the appendix.
4	Check the telephone wire and connections between the MDF(s) and the CO port(s). Check the telephone wire mapping on the MDF(s).
5	Check the connection from the MDF(s) to the PBX or the telephone company PSTN or ISDN switch.
6	Make sure the in-house wiring works and is connected properly.
7	Repeat the steps above using a different DSL port.

9.5 The WAN Link is Down

Table 9-5 WAN Link Troubleshooting

STEP	CORRECTIVE ACTION
1	Check that the uplink and downlink ports on the management switch card are properly connected to a WAN Ethernet using either copper Ethernet cables or fiber optic cables.
2	If you enable port trunking, make sure the peer WAN switch also has port trunking enabled; see the <i>MSC1000 User's Guide</i> .

9.6 Testing Wiring

Use the following tests if there is no voice.

Systematically test wiring using a functioning telephone to determine if there is a wiring problem. If the connection is good, the telephone will return a dial tone. Letters in the figure shown next indicate the systematic tests to be done. Suppose you're using installation scenario "B" as shown in the chapter on MDF connections. The logic for other scenarios should be similar.

Use steps A-D if there is no voice but you can transmit data. Use all of the steps if there is no voice and you cannot transmit data.

- A. Test A determines if there is a wiring problem between the CO and MDF 1.
- B. Test B determines if there is a wiring problem between MDF 1 and MDF 2.
- C. Test C determines if there is a wiring problem between MDF 2 and the **USER** Telco-50 connector on the IES-2000 splitter chassis.
- D. Test D determines if there is a problem with the splitter chassis card or splitter chassis.
- E. Test E determines if there is a wiring problem between the **USER** Telco-50 connector on the splitter chassis and MDF 3.
- F. Test F determines if there is a building-wiring problem between the subscriber's wall jack and MDF 3.

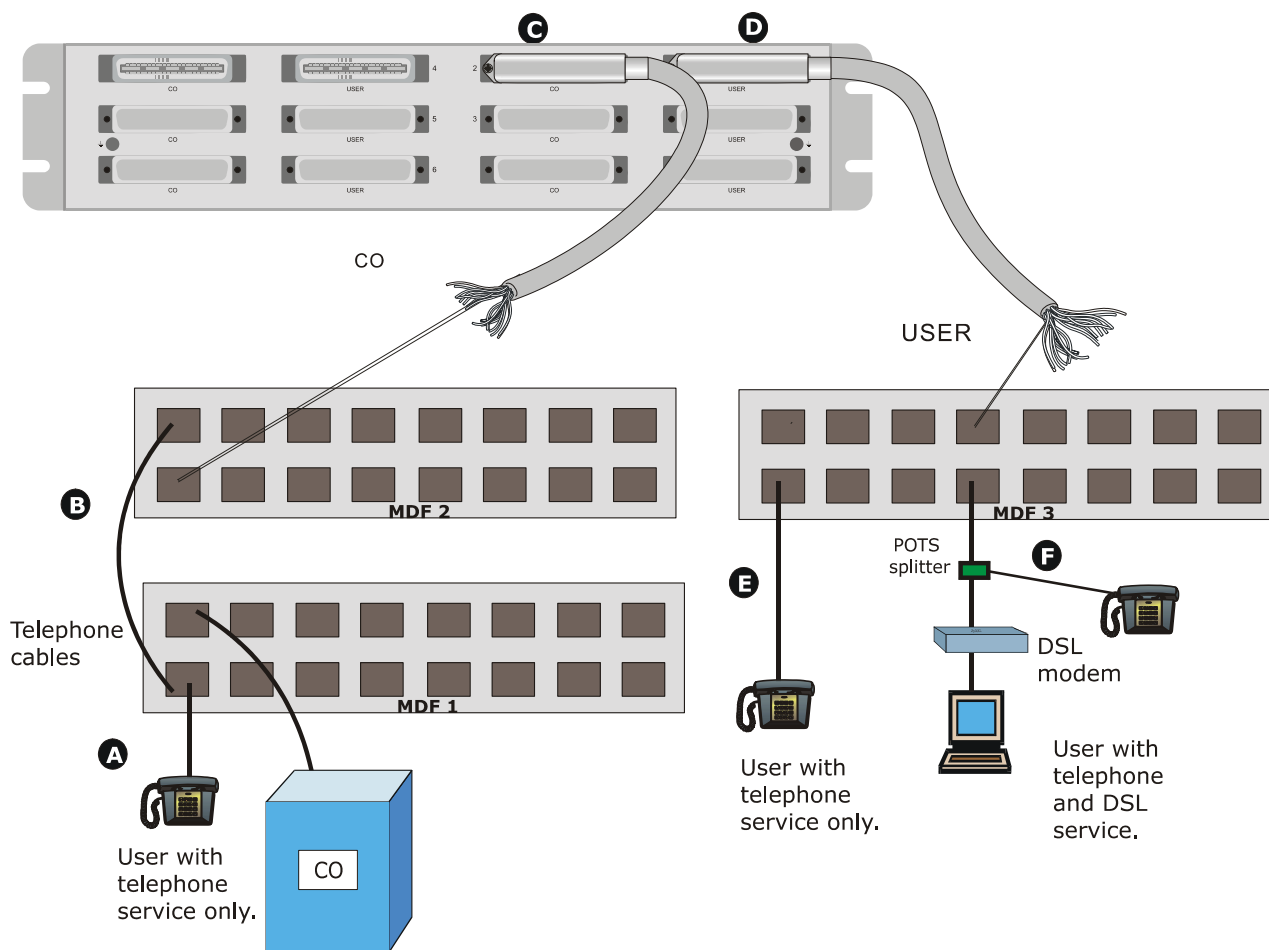


Figure 9-1 Testing In-house Wiring

Table 9-6 Testing Wiring

STEP	TEST
A	Connect a standard telephone to MDF 1. If there is no dial tone, then a problem with the wire or wire connections between MDF 1 and the CO exists. Contact your telephone company for troubleshooting.
B	Connect a telephone to the upper port of MDF 2. If there is no dial tone, then the problem is between MDF 1 and MDF 2. Check the telephone wire and connections between MDFs 1 and 2.
C	Disconnect the Telco-50 cable from the splitter chassis' Telco-50 CO connector. Connect a telephone to the appropriate pins of the Telco-50 cable's Telco-50 connector. If there is no dial tone, then the problem is between the splitter chassis Telco-50 CO connector and MDF 2. Check the Telco-50 cable's pin assignments (refer to the appendices for the proper pin assignments). Replace the Telco-50 cable if the pin assignments are OK and there is still no dial tone.

Table 9-6 Testing Wiring

STEP	TEST
D	Reconnect the Telco-50 cable to the splitter chassis' Telco-50 CO connector. Disconnect the Telco-50 cable from the splitter chassis' Telco-50 USER connector. Connect a telephone to the appropriate pins of the splitter chassis' Telco-50 USER connector (refer to the appendices for the proper pin assignments). If there is no dial tone, make sure that the splitter card is properly installed. Try a different splitter card. If using a different splitter card solves the problem, replace the first splitter card. If using a different splitter card does not solve the problem, the splitter chassis may be faulty, contact your vendor.
E	Reconnect the Telco-50 cable to the splitter chassis' Telco-50 USER connector. Connect a telephone to a lower port of MDF 3. If there is no dial tone, then the problem is between the splitter chassis Telco-50 USER connector and MDF 3. Replace the Telco-50 cable connecting the USER port to MDF 3. If the problem remains, check the pin assignments of the USER Telco-50 connector. If the problem remains, then the IES-2000 or MDF 3 is faulty. Repeat the test in step A using MDF 3 to determine if MDF 3 has problems. Contact the telephone company if that is the case. If not, contact your IES-2000 vendor outlining the problem and the steps you took to solve it.
F	Disconnect the DSL modem from the wall jack and connect the telephone to the wall jack. If there is no dial tone, then there is a problem with the building wiring between the DSL subscriber's home and the MDF. Contact your telephone company for troubleshooting.

Part V:

Appendices and Index

This part gives appendices and an index.

Appendix A

Safety Warnings

- Refer to the *Hardware Specifications appendix* for the gauge of wire to use for each connection.
- The length of exposed (bare) IES-2000 power wire should not exceed 7mm.
- Do not use this product near water, for example, in a wet basement.
- Only a qualified technician should service or disassemble this device.
- Avoid using, servicing or disassembling this device during an electrical storm as there may be a risk of electric shock from lightning.
- Always disconnect all telephone lines from this device before servicing or disassembling.
- Fuse Warning! Replace fuse only with fuse of the same type and rating.
- Fan Module Warning! Use the fan module handles when pulling out or pushing in the fan module. Be careful not to put fingers or objects inside the fan module.
- To avoid risk of electric shock, remove only one card at a time and do not place fingers or objects inside the chassis. Cover empty slots with slot covers.
- Energy Hazard Warning! Remove all metal jewelry, watches, and so on from your hands and wrists before servicing this device.

Appendix B

Hardware Specifications

This appendix gives details about the IES-2000 hardware.

Physical Specifications

The IES-2000 is 19 inch (482.6mm) rack-mountable.

Main Chassis

See the following table for the number of slots in the main chassis as well as how many are for DSL line cards and how many are for the management switch card (or Ethernet extension card).

Chart 1 Main Chassis Slots

NUMBER OF SLOTS:	TOTAL	FOR DSL LINE CARDS	FOR MSC
IES-2000 Main Chassis	6	5	1

IES-2000 Splitter Chassis

The IES-2000ST (Splitter chassis Telco-50) or IES-2000SW (Splitter chassis Wire wrapping) each has 5 slots for cards.

The IES-2000ST rear panel has six pairs of Telco-50 connectors. One **USER** Telco-50 connector and one **CO** Telco-50 connector are not used. Connect five **USER** Telco-50 connectors to the subscribers and five **CO** Telco-50 connectors to the PSTN or ISDN switch.

The IES-2000SW rear panel has six sets of wire wrapping pins. One set of wire wrapping pins is not used. Connect each of the other five sets to both the subscribers (**USER**) and the PSTN or ISDN switch (**CO**).

Chassis Dimensions and Weights (Without Cards)

Chart 2 Chassis Dimensions and Weights (Without Cards)			
CHASSIS	DIMENSIONS		WEIGHT
IES-2000 Main Chassis	4U	442.7mm (W) x 268mm (D) x 178mm (H)	8.4 kg
IES-2000 Splitter Chassis	2U	442.7mm (W) x 280mm (D) x 89mm (H)	7 kg

Required Mounting Hardware

Chart 3 Required Mounting Hardware

UNIT	MOUNTING BRACKETS	M4 FLAT HEAD SCREWS	M5 FLAT HEAD SCREWS
IES-2000 Main Chassis			Four
IES-2000 Splitter Chassis			Four

Telco-50 Cable Lengths for Connecting to Splitter Chassis Cards

Chart 4 Telco-50 Cable Lengths for Connecting to Splitter Chassis Cards

CHASSIS AND CARDS	ZYXEL'S TELCO 50 CABLES TO USE
IES-2000's DSL line cards in slots 5 and 6	48 cm
IES-2000's DSL line cards in slots 2 through 4	31 cm

Wire Gauge Specifications

Chart 5 Wire Gauge Specifications

WIRE TYPE	REQUIRED AWG NO. (DIAMETER)
Ground Wire	18 or larger
Telephone Wire	26 or larger
IES-2000 Power Wire	16 to 18

AWG (American Wire Gauge) is a measurement system for wire that specifies its thickness. As the thickness of the wire increases, the AWG number decreases.

Power Consumption

This table describes the maximum power consumption of the IES-2000.

Chart 6 Power Consumption

MAXIMUM:	WATTS	VOLTS DC	AMPS
IES-2000	300	-36 to -57	8

Use a -48VDC power source with 300W minimum output for the IES-2000.

Fuse Ratings

This table describes the fuse ratings of the IES-2000.

Chart 7 Fuse Ratings

UNIT	NUMBER OF FUSES	TYPE	AMPS	VOLTS AC	DIMENSIONS
IES-2000 Fan Module	2	T	0.5	250	5mm (D) x 20mm (L)
IES-2000 Power	2	T	10	250	5mm (D) x 20mm (L)

Operating Environment

- Temperature: 0 - 50°C
- Humidity: 5% - 95% (non-condensing)

Storage Environment

- Temperature: -25 - 70°C
- Humidity: 5% - 95% (non-condensing)

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